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Immediate Water Pollution Control Needs Illinois River Basin Arkansas and Oklahoma

Federal Water Pollution Control Administration, Dallas, Texas

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PB 266 396

IMMEDIATE WATER POLLUTION CONTROL NEEDS

ILLINOIS RIVER BASIN

ARKANSAS AND OKLAHOMA

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTH CENTRAL REGION
DALLAS, TEXAS 75202

APRIL 1967

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16. ABSTRACT

The purpose of the report is to focus attention on known sources of water pollution in this area and to provide a priority for action to correct existing problems and to prevent future problems.

17. KEY WORDS AND DOCUMENT ANALYSIS

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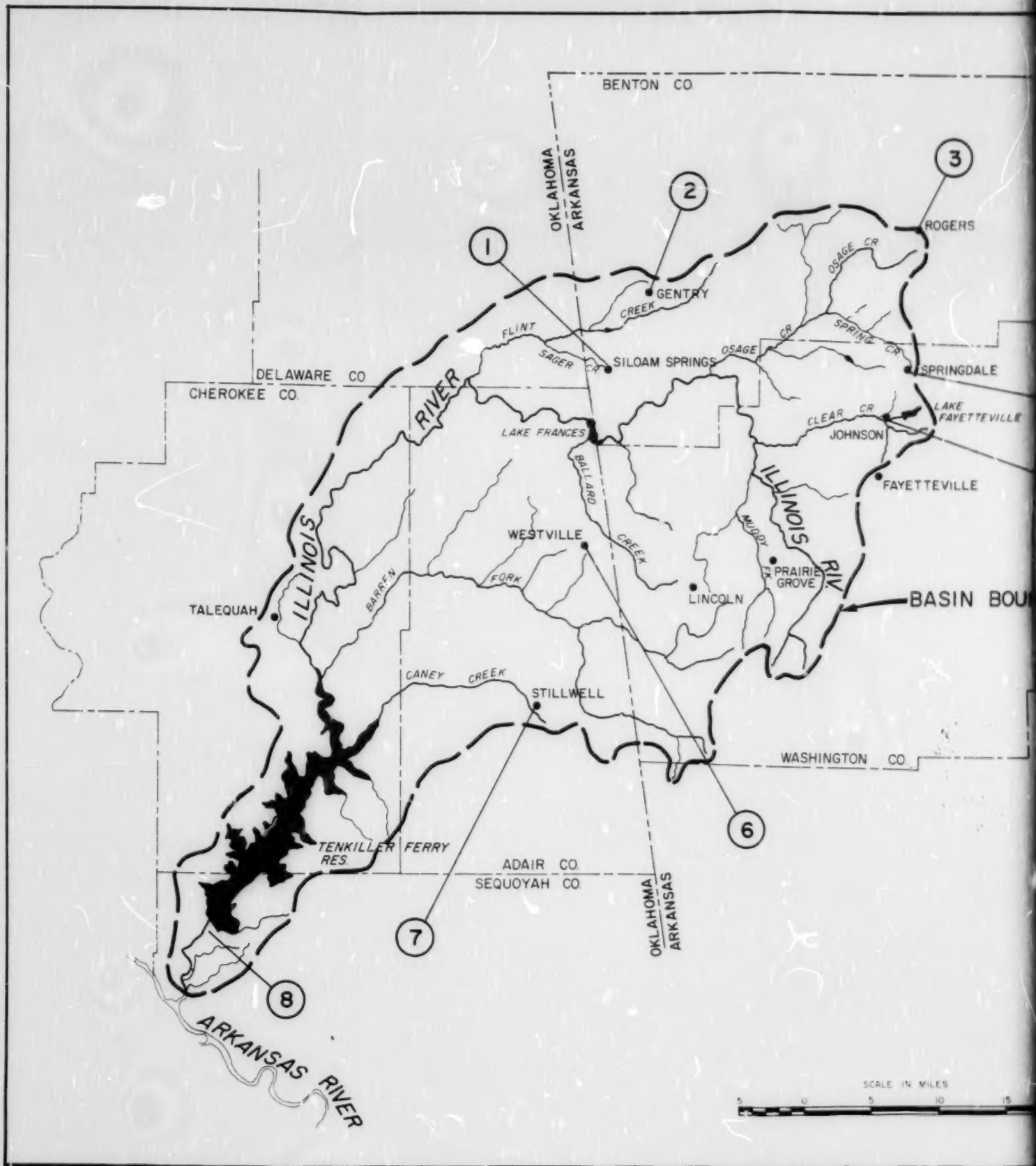
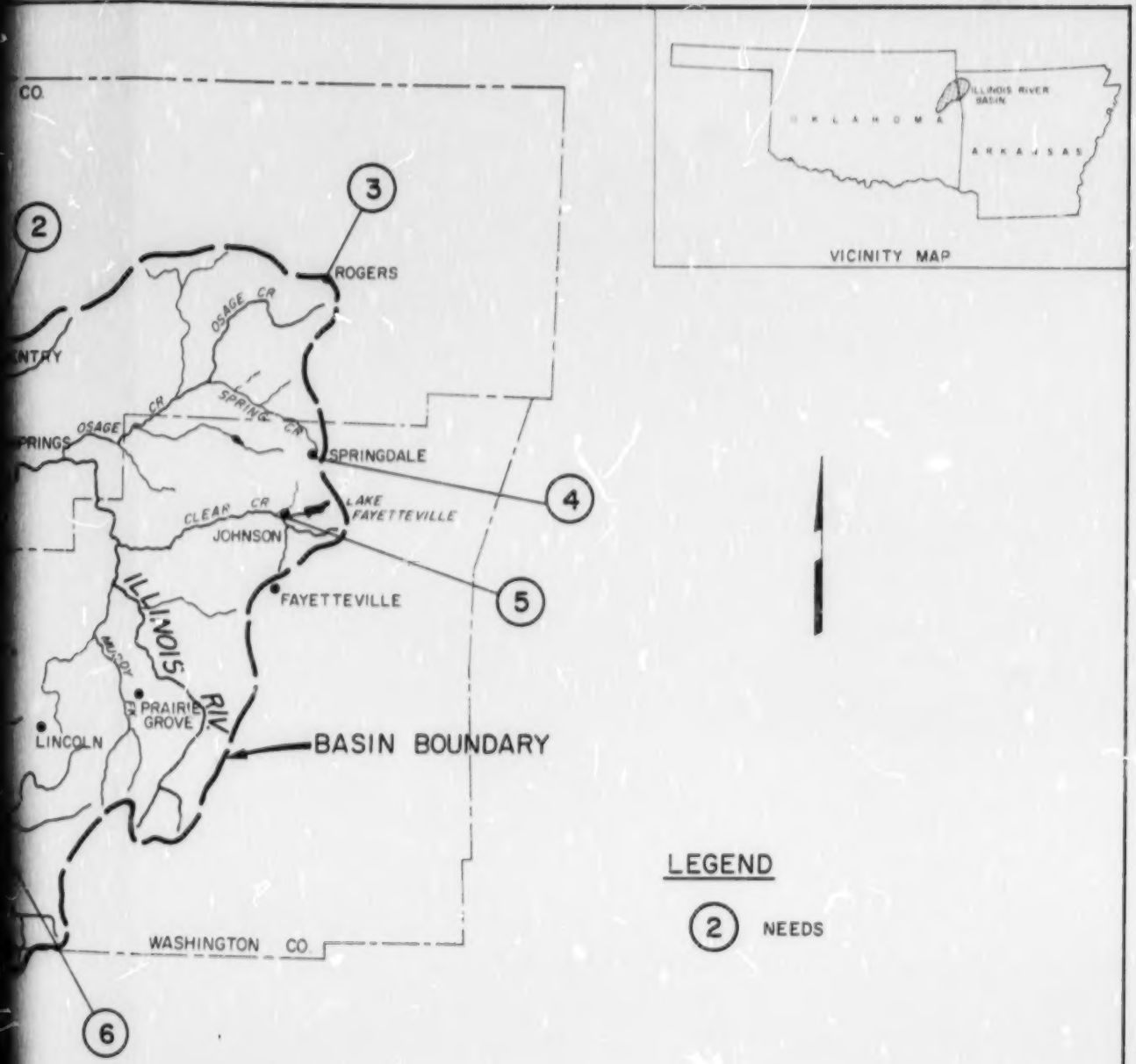
I. Introduction

The purpose of this report is to focus attention on known sources of pollution and to provide a priority for action to correct the existing water pollution problems and prevent future problems in the Illinois River, (see figure 1), an interstate stream, and its tributaries. This report is based on compilations of available data of the Federal Water Pollution Control Administration, South Central Region, and the pollution control agencies of Arkansas and Oklahoma. No detailed water quality surveys or engineering studies were carried out for the preparation of this report.

The findings of this report are based on the best information available at this time on water quality conditions and immediate and potential pollution abatement needs. The omission of any particular town, industry, or other establishment from this report does not imply that an immediate or potential pollution abatement need may not possibly exist in that particular area. Priorities listed are based solely on an evaluation of the Illinois River basin and not on a relative basis with other basins in the South Central Region.

Authority is given in section 3(a) of the Federal Water Pollution Control Act, as amended, for the preparation or development of comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries thereof, and improving the sanitary conditions of surface and underground waters. This report, by describing the immediate needs for controlling water pollution in the Illinois River basin, represents the first step in the development of a comprehensive program to control water pollution in this basin.


BENTON CO.
OKLAHOMA
ARKANSAS
1
2
3
ROGERS
OSAGE CR.
GENTRY
CREEK
FLINT
SAGER CR.
SILOAM SPRINGS
OSAGE CR.
SPRING CR.
SPRINGDALE
DELAWARE CO.
CHEROKEE CO.
RIVER
LAKE FRANCES
CLEAR CR.
LAKE FAYETTEVILLE
JOHNSON
BALLARD CREEK
ILLINOIS RIV.
FAYETTEVILLE
WESTVILLE
MUDDY CR.
PRAIRIE GROVE
BARREN FORK
LINCOLN
TALEQUAH
BASIN BOU
CANEY CREEK
STILLWELL
WASHINGTON CO.
6
TENKILLER FERRY RES.
ADAIR CO.
SEQUOYAH CO.
OKLAHOMA
ARKANSAS
7
8
ARKANSAS RIVER
SCALE IN MILES
5 0 5 10 15



IMMEDIATE WATER POLLUTION CONTROL NEEDS
ILLINOIS RIVER BASIN—ARKANSAS & OKLAHOMA

LOCATION MAP

UNITED STATES DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
SOUTH CENTRAL REGION APR 1967 DALLAS, TEXAS

FIGURE 1

II. Summary of Immediate Pollution Control Needs

Pollution problems in the Illinois River basin, as indicated by septic conditions, heavy algae growths, elevated water temperatures, and oxygen depletion, result in damages to fish propagation, water supply and recreation uses, and aesthetics. The immediate pollution control needs are listed in the following tabulation and grouped into categories: waste treatment, flow regulation, institutional practices, and research. Location designations refer to figure 1.

Location	Responsibility	Need	Priority
Waste Treatment			
1	City of Siloam Springs, Arkansas	Advanced waste treatment for removal of nutrients	A
1	Ozark Poultry Products, Siloam Springs, Arkansas	Secondary treatment and advanced treatment for removal of nutrients	A
1	Allen Canning Co. Siloam Springs, Arkansas	Primary and secondary treatment and advanced treatment for removal of nutrients	A
2	City of Gentry, Arkansas	Final clarifier	A
3	City of Rogers, Arkansas	Advanced waste treatment for removal of nutrients	A
4	City of Springdale, Arkansas	Advanced waste treatment for removal of nutrients	A
5	Forest Park Canning Co., near Johnson, Arkansas	Primary and secondary treatment and advanced treatment for removal of nutrients	A
6	City of Westville, Oklahoma	Plant enlargement or treatment at cannery and advanced waste treatment for removal of nutrients	A
Flow Regulation			
8	Corps of Engineers and/or Southwestern Power Administration	Illinois River below Tenkiller Ferry Reservoir - storage to provide minimum flow of 40 cfs for quality control	B

Location	Responsibility	Need	Priority
Institutional Practices			
Basinwide	States of Arkansas and Oklahoma	Adopt water quality standards	B
Basinwide	States of Arkansas and Oklahoma	Consider legislation to provide appropriations for State participation in grants for construction of sewage treatment works.	B
Basinwide	States of Arkansas and Oklahoma	Consider expansion of water quality control surveillance program (including treatment plant operation and maintenance)	A
Basinwide	States of Arkansas and Oklahoma	Prepare and maintain a complete industrial waste discharge inventory for industries not connected with municipal treatment systems.	B
Research			
Basinwide	Federal government, States of Arkansas and Oklahoma, and various research institutes	Pursue research to provide effective and economical means of removing nutrients from waste waters	A

III. Immediate Control Needs

Various measures are needed to control existing and potential water pollution of the Illinois River and its tributaries. These measures are required to abate septic conditions, reduce algae growths, control stream temperatures, and increase oxygen content for the protection of water uses within the basin, including fish propagation, water supply and recreation uses, and aesthetics.

The actions recommended here, though not all encompassing, are, however, prerequisite to good water quality planning and should be included in local, State, and Federal programming for water pollution control. Background for these immediate needs is summarized in Chapter VI.

Waste Treatment

Advanced waste treatment facilities for the removal of nutrients are needed for the cities of Siloam Springs, Rogers, and Springdale, Arkansas. Enlarged treatment plant capacities and advanced waste treatment facilities for the removal of nutrients are needed for the cities of Stilwell and Westville, Oklahoma. Three food processing industries in Arkansas (as listed in the summary table) need to provide adequate treatment facilities, including advanced waste treatment facilities for the removal of nutrients. The city of Gentry, Arkansas, needs to provide a final clarifier for its waste treatment plant. Implementation of each of these projects should carry a high priority.

The list of needs is not considered all inclusive and does not reflect projected needs due to future obsolescence or to expanded or changed water uses.

Flow Regulation

Maintenance of higher low flows in the Illinois River between Tenkiller Ferry Dam and the confluence with the Arkansas River is needed to sustain a high quality trout fishing area. Reallocation of a portion of the conservation pool or the power pool is needed to provide a minimum flow of 40 cubic feet per second (cfs) in the river below the dam.

Institutional Practices

To strengthen the States' position on prevention, control, and abatement of stream pollution, water quality standards are needed on interstate and intrastate streams. State participation is needed in the waste treatment plant construction grants program to accelerate the construction of needed improvements. Increased surveillance and operation inspection of sewage and industrial waste treatment plants

are needed to locate and identify existing or potential serious pollution problems. For more rigid control over industrial pollution and aid in solving complex stream quality problems, a complete and up-to-date inventory is needed of industrial waste discharges to basin streams, listing quantity and quality of effluent and other pertinent data.

Research

Research, conducted by the Federal government, the States of Arkansas and Oklahoma, and various research institutes, should be actively pursued to provide effective and economical means of removing nutrients from waste waters.

IV. Cost of Immediate Pollution Abatement

Recent research indicates that complete removal of phosphorus components from wastes may be possible by improved activated sludge type waste treatment plants. However, more research is necessary to develop techniques for the adequate removal of nitrogen components in waste discharges. No estimate of cost has been attempted for this necessary research.

Due to the lack of information on processes for the removal of the nitrogen components from waste discharges, it is difficult to assign a definite cost for the necessary treatment facilities needed to correct the problems in the upper reaches of the basin. However, if current research leads to adequate nutrient control techniques in the near future, it is estimated that a first cost expenditure in excess of two million dollars will be required to solve the nutrient problem.

Although a cost has not been assigned to the need for quality control releases from Tenkiller Ferry Reservoir, it is expected that the cost of this need will be equal to the loss in power production due to the reallocation of storage for this purpose.

No estimate of cost is attempted for institutional practices.

V. Recent Progress in Pollution Control

There have been no Federal or State legal actions taken regarding pollution in the upper Illinois River basin. Although the municipalities have provided conventional secondary treatment, the problems resulting from excessive nutrient loading remains unchecked. The municipalities, industries, and appropriate State agencies agree that nothing more can reasonably be done until a feasible method for nutrient control is developed.

Through a continuing Federal construction grants program, treatment facilities and appurtenant works have been constructed at 5 towns in the basin. These have been completed since 1958.

The towns of Prairie Grove and Rogers, Arkansas, are presently studying expansion or renovation of present waste treatment plants in order to provide for further growth in these towns. The town of Siloam Springs, Arkansas, is presently studying a project to connect the two industries which presently discharge directly to Sager Creek into the municipal waste treatment system. The town of Stilwell, Oklahoma, is presently studying a project to provide separate treatment for the canning industry located in that town.

VI. Background

Pertinent Basin Characteristics

The Illinois River originates in the Ozark Mountains of western Arkansas, flows into Oklahoma near Siloam Springs, Arkansas, and discharges into the Arkansas River just above its confluence with the Canadian River. The basin has a drainage area of nearly 1,700 square miles. Tenkiller Ferry Reservoir, a 1,230,000 acre-foot impoundment on the Illinois River, is located about 13 miles above the Arkansas River. This reservoir, completed by the Corps of Engineers in 1953, is used for flood control, hydroelectric power, and recreation.

The entire Illinois River basin is sparsely populated. Principal communities in the basin had a combined 1960 population of 30,774. The largest community in the basin is Springdale, Arkansas, with a 1960 population of 10,076.

The economy of the basin is based primarily on various agricultural activities in the area. The primary industrial activities in the various towns within the basin include chicken processing, vegetable canning, and various other types of food processing.

Water Quality

The waters of the Illinois River are of high quality. The base flow in the river originates from springs located in the upper reaches of the basin and is relatively large and well sustained. Flow and quality data are shown in the following table:

Flow and Quality Data
Illinois River

Location	Mean Annual Flow (cfs)	Dissolved Solids (mg/l) Max.	Dissolved Solids (mg/l) Min.	$CaCO_3$ Hardness (mg/l) Max.	$CaCO_3$ Hardness (mg/l) Min.	Conductance umhos 25°C. Max.	Conductance umhos 25°C. Min.
Below Tenkiller Ferry Reservoir	1,603	138	79	107	61	396	123
Near Tahlequah, Oklahoma	901						
Near Oklahoma-Arkansas Line	619						

Source: U.S. Geological Survey

The waters of the Illinois River basin are used primarily for recreation, although various streams are used for water supply. Recreational uses in the basin above Tenkiller Ferry Reservoir are primarily fishing and swimming, while the reservoir is used for fishing, swimming, boating, water skiing, and other related activities. The Illinois River below Tenkiller Ferry Reservoir is the only trout fishing area in the State of Oklahoma. The towns of Tahlequah and Gore in Oklahoma, and the towns of Springdale, Gentry, and Siloam Springs in Arkansas utilize surface waters of the basin for water supply. Various other towns in the basin use some of the springs for water supply.

Present Water Quality Problems

Pollution of streams in the Illinois River basin at the present time is not a severe problem. Some localized pollution does occur, however, due primarily to heavy nutrient loadings on minor tributary streams.

Municipal and Industrial

A number of tributary streams in the upper reaches of the basin are troubled by heavy algae growths. These algae problems are due primarily to the inability of conventional sewage treatment plants to remove nutrients from the waste discharges. The heavy nutrient loads produced by these plants are due to the treating of wastes from the various food processing industries located in these towns. These nutrient loads are generally heavy with respect to the size of the receiving streams, and produce heavy algae growths which damage the aesthetics and recreational uses of the streams.

There are also several food producing industries which discharge inadequately treated wastes to tributary streams creating septic conditions and adding to the nutrient problem in these streams.

The sources of pollution related to this problem are summarized in the following tabulation.

Tributary	Source of Nutrient Load	Persistence
Sager Creek	Siloam Springs, Arkansas, sewage treatment plant	Continuous with seasonal peaks
	Ozark Poultry Products, Siloam Springs, Arkansas, primary treated wastes	Continuous with seasonal peaks
	Allen Canning Co., Siloam Springs, Arkansas, untreated wastes	Seasonal

Tributary	Source of Nutrient Load	Persistence
Osage Creek	Rogers, Arkansas, sewage treatment plant	Continuous with seasonal peaks
Spring Creek	Springdale, Arkansas, sewage treatment plant	Continuous with seasonal peaks
Clear Creek	Forest Park Canning Co. near Johnson, Arkansas, untreated wastes	Seasonal
Caney Creek	Stilwell, Oklahoma, sewage treatment plant	Seasonal
Tributary to Barren Fork	Westville, Oklahoma, sewage treatment plant	Seasonal

Another tributary stream in the upper reaches of this basin which has a minor pollution problem is Flint Creek near the town of Gentry, Arkansas. The recreational uses in a short stretch of Flint Creek are restricted due to downgrading of the quality of this creek by discharges of inadequately treated municipal wastes from the town of Gentry. These inadequately treated wastes cause sludge deposits and algae problems in a short stretch of this stream.

Illinois River below Tenkiller Ferry Reservoir

Due to the fact that the Illinois River below Tenkiller Ferry Reservoir has been established as a trout fishing area, it is important that proper temperatures be maintained in this stretch of the river in order to preserve this fishery. Temperatures below 68° F. are generally maintained in this stretch of the river due to releases of colder water from the reservoir during periods of power production. Temperature problems are primarily encountered on weekends during the summer months when power production has been curtailed. The lack of cold water releases during these periods occasionally allows the temperature of the stream to rise above the 68° F. lethal level for trout.

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